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ABSTRACT

Teaching and testing for critical thinking can be a challenge for new and experienced social work educators because critical thinking has no operational definition. Bloom's Taxonomy of Educational Objectives is a tool from the wider context of education that can help new and experienced social work educators to think more precisely about what it means to teach and test for critical thinking. Bloom's Taxonomy includes six knowledge levels: knowledge, comprehension, application, analysis, synthesis, and evaluation. This survey paper presents each level along with sample test items and general guidelines for writing test questions. Cites 10 resources. (Author/BB)

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Understanding and Testing for "Critical Thinking" with Bloom's Taxonomy of Educational Objectives

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ABSTRACT

Testing for critical thinking can be a challenge for new and experienced social work educators because critical thinking has no operational definition. Educational objectives commonly include the word "understanding," but what does understanding mean and how do social work educators test for it? Bloom's Taxonomy of Educational Objectives can help social work educators to think more precisely about critical thinking. Bloom's taxonomy includes six knowledge levels: knowledge, comprehension, application, analysis, synthesis, and evaluation. The taxonomy levels are presented along with sample test items to show social work educators what kinds of test items tap higher knowledge levels. General guidelines for writing test questions are also presented.

INTRODUCTION

Social work educators who wish to go beyond testing for memorization or "rote" learning will find that "critical thinking" has no clear operational definition and is too broad a term for practical use in the social work classroom. Critical thinking is a theoretical construct and we must measure behaviors that point to it instead of measuring it directly (Bloom, 1956; Wiggins & McTighe, 1998). This may be why educators can experience difficulty writing exam questions that do more than test for simple memorization. However, what is "understanding" and how do we recognize it in the social work classroom? A tool from the wider context of education, Bloom's Taxonomy of Educational Objectives (Bloom, 1956), can help social work educators to think more precisely about what we test on our exams. Today we will examine the six knowledge levels of Bloom's taxonomy of educational objectives, sample test items, and general test construction guidelines.

Bloom's Taxonomy of Educational Objectives

The Taxonomy of Educational Objectives (1956), also called simply Bloom's taxonomy, was written to add clarity and precision to the potentially challenging task of writing educational objectives. Educational objectives referring to students "knowing about" or "understanding" a topic are common in education, but are too broad to guide teaching and testing. Bloom's taxonomy does not explicitly define critical thinking. Rather, it includes six knowledge levels that constitute critical thinking. The six knowledge levels can help us to clarify what critical thinking and "understanding" mean. The taxonomy applies to all materials in the social work curriculum, including the

knowledge courses (e.g., introductory courses), skill courses (e.g., practice methods) and field instruction. The taxonomy also can be utilized most testing formats including: completion, short answer, essays, written projects, multiple-choice, true/false, and matching formats. Although most of my testing examples utilize the multiple-choice format, they can easily be converted into the true/false, short answer, or essay formats.

Figure one shows the six taxonomy knowledge levels arranged from the lowest level (knowledge) to the highest (evaluation), along with verbs associated with common student expectations (Bloom, 1971; Green, 1970, 1975). The knowledge levels are discrete and mastery of one level does not insure that students can automatically perform to higher levels. For example, simply knowing the elements of an intervention plan (knowledge) does not guarantee that students can produce one (synthesis) or critique one (evaluation). Teaching and testing are therefore linked, and teaching must support whether testing, for example, requires recognition of the name "Mary Richmond" (knowledge) or requires a critique of her contribution to social work (evaluation).

Figure 1. Bloom's Taxonomy and Common Student Expectations

Knowledge Level	Common Student Expectations
Knowledge	Define, identify, state, list, differentiate, discriminate, recognize
Comprehension	Explain, translate, interpret, match, extrapolate
Application	Construct, choose, predict, demonstrate
Analysis	Distinguish, separate, organize, infer, classify
Synthesis	Compose, formulate, create, produce
Evaluation	Debate, judge, critique, assess, compare

Note: Adapted from: Bloom, 1971; Green, 1970, 1975.

Knowledge

Knowledge is the lowest or simplest taxonomy level. Knowledge can be considered the facts or information students must learn. Knowledge is probably the most common level tested in higher education because instructors can simply use a textbook to determine what "knowledge" students must learn and create exams targeted to a textbooks' contents (Bloom, 1956). Creating knowledge test items can be as simple as removing the key word from a sentence and making it a choice among multiple choices, omitting a key word or phrase students must supply, or having students decide if a complete sentence is either true or false.

Figure one includes eight sample knowledge items. Items 1-4, and item 7, require students to recognize material learned in class from among incorrect choices. In item five students must recognize the definition of a statistical test, and in item six students must recognize a research term translated into a dialogue. In item eight involves recognizing an example of a term leaned in class. Students can easily memorize material and correctly answer several of these items without "understanding" them (Gentile, 1990). After all, answering item one correctly does not mean students understand the purpose of NASW. Understanding refers to the next levels of Bloom's taxonomy.

Figure 2. Knowledge Level Test Items

1) What is the Social Work professional organization called?

NASW **	CSW	CSWE
DSW	AMA	

2) How much is the current food budget from the poverty line?

$1.00	$3.00	$.89
$1.98	$1.19 **	

3) Respectively, which choice shows the strongest positive, and strongest inverse correlations?

-1.0, -.20	+.96, -.89 **	-.99, +1.0
+.85, -.20	+.96, +.05	

4) What do progressives suggest the multiplication factor should be for the poverty line?

2.9	.98	3.0
5.6	4.0**	

5) Assuming ordinal data, which statistical test will determine if a sample and population have similar demographics?

ANOVA	Correlation coefficient	Chi square ***
Dependent *t*-test	Frequency distribution	

6) Student: "The client was slapped 3 times in one day." Supervisor: "How badly were they hurt?" The supervisor wants to know about:

Frequency	Intervals	Duration
Magnitude ***	Precipitating events	

7) The majority of the social welfare budget is spent on which population group?

Poor young adults	Children	The elderly ***
The sick and disabled	The disabled poor	

8) Given the context of material covered in class, which one is an example of Comparable Worth?

Everyone pays the same proportion of income tax
Jobs would be created so everyone would have work
Different people are paid similarly for similar work**
Women would have access to universal day care
Wages are raised for everyone

Comprehension

Comprehension involves having students demonstrate they, for lack of a better word, understand material by doing more than simply memorizing and repeating it. Aspects of comprehension involve translation, interpretation, and extrapolation. Translation involves translation of learned material into a different, but correct, form. Interpretation involves summarization of learned material or examining material from different views. Extrapolation involves identifying trends and consequences.

Figure three includes six comprehension test items. In item one and two, students must recall the conservative, liberal, progressive ideologies (Macht & Quam, 1986), recognize the listed poverty theories (Schiller, 1998; Waxman, 1983) and match the theories with their political orientation. In items 3-6, students must recognize research and statistical terms translated into non-technical language. To correctly answer these items, students must do more than memorize and recall the association between "statistical significance" and $p<.05$. In item seven students must recognize the purpose of an element of an intervention or action plan. Creating comprehension questions are more difficult than creating knowledge questions because words or phrases cannot simply be removed from a sentence and hidden among multiple-choices.

Figure 3. Comprehension Level Test items

1) Which of these poverty theories is politically the most progressive?
Genetic Inferiority Theory Functionalist Explanation Culture of Poverty
Subclass Theory ** Orthodox Economic Theory

2) The theories of poverty that are politically and economically the most progressive of the ones listed here are:
Orthodox Economic Theory and Functionalist Explanation
Culture of Poverty and Dual Labor Market Theory
Subclass Explanation and Culture of Poverty
Dual Labor Market Theory and Subclass Explanation ***
Functionalist Explanation and Subclass Explanation

3) "Statistical significance" means what?
Decreased odds that results are due to "chance" **
The measures used have external validity
The study has internal validity
Increased odds that correct statistics were employed
The study was conducted in a reliable manner

4) The phrase "statistical significance" means:
That a quasi –experimental study has internal validity
Increased odds that "correct" statistics were employed
The measures used to collect data have external validity
Increased odds that results are not due to "chance" ***
The study was conducted in a "reliable" manner

5) Another way to describe the median score is calling it the:
Midpoint *** Shape of the score distribution All of the above
Average score Outlying scores in the score distribution

6) What problem could happen if we interview people whose lives were saved by the police, but use police officers to conduct the interviews?
Reductionism Operationalizing variables Reactivity ***
Scientific determinism Logical consistency

7) What should the **plan of action** include to help clients see they are making progress?
Short & long term goals ** Partializing & prioritizing Objectivity & feedback
Assessment & information gathering Listening & empathy

Application

Application involves carry-over or transfer of learning to new situations or situations new to the students. Application is an important knowledge level for social work since our students must eventually apply what they learn to the problems clients will present. Creating different scenarios for teaching and testing involves advance preparation and can be time consuming. However, using the same example or scenario for teaching and testing means students may memorize the example without understanding it.

In figure four, item one requires students to recall the definition of a causation (or feedback) loop and apply it to a scenario (e.g., cartoon characters) different from what I taught in class. Item two is similar and students must apply specific communication errors to a novel set of communications I did not utilize in class (Eriksen, 1979). Item three requires students to apply research concepts to an imaginary research study (Ellenbogen, 1993). In items 4-6, students must apply research concepts to new examples of those concepts and terms. Item seven is a sample essay question that requires students to apply their knowledge of President Reagan and his view of social welfare, to the New Deal.

Figure 4. Application Level Test Items

1) Donald Duck doesn't think Goofy will be a good Disneyland tour guide and chooses Mickey instead. What is this called?

Good Judgment	Causation Loop **	Institutional Racism
Institutional Discrimination	All of the above	

2) Respectively, what type of communication occurs in these three statements?
(a) "Your child has acute exogenous bromadrosis but...
(b) "Don't feel bad because...
(c) "We have seminars for people who want to be better parents."

Cliche, labeling, professionalitis	Cliche, professionalitis, labeling
Labeling, professionalitis, cliché	Professionalitis, labeling, cliches
Professionalitis, cliches, labeling **	

3) Identify the variables in the order they occur in this research study: "The effects of hanging on demonic possession in Quakers & Pilgrims"

Dependent, Control, Independent	Independent, Control, Dependent
Independent, dependent, control **	Control, dependent, independent
Control, independent, dependent	

4) Which choice shows the general relationship between cardiovascular fitness, and blood pressure?

-1.0 ***	+.20	+1.0
-.25	+1.5	

5) If we change a *p* level from .05 to .001, the probability our results are **NOT** due to chance:

Increases ***	Decreases
Increases, but external validity decreases	Stays the same
Decreases, but reliability increases	

6) Which research question is probably explanatory?
Which children ENJOY visiting Disneyland the most?
What characterizes children who visit Disneyland?
What are the top attractions in Disneyland?
Why do children enjoy their visit to Disneyland? ***
How many children visit Disneyland?

7) Essay Question:
Describe how the Social Security Act would have been different if President Reagan wrote it.

Analysis

Analysis requires examination of parts or elements of concepts, analyzing the relationship between conclusions and evidence, organizing knowledge based on a principle, or making inferences based on data. In figure five, item one requires students to determine if a valid conclusion has been drawn from a table of statistical results (included on the exam). Item two has students infer what an American president thought based on legislation he proposed. Item three is similar and involves a popular writer on social policy issues. These types of items can be created utilizing the myriad of historical figures and events related to social work. In item four, students must utilize political ideologies to reorganize historical events related to poverty to determine which choice does not belong with the others. In item five students must utilize a contingency table to answer a question related to the safety of the drug thalidomide. I teach students about the decision to use thalidomide (and other more current drugs) but do not have students apply this example to the contingency table until the exam. If this exact material is taught in class in this form, students simply memorize the answers without understanding the concepts.

Figure 5. Analysis Level Test Items

1) Turn to the study on page 132 in your text. "All the perpetrators of sexual abuse in this study were first time offenders". Does the data in table C support this claim?
   Yes, the data supports the claim
   No, the data does not support the claim **
   The data partially supports the claim

2) Based on what President Roosevelt did in the New Deal, he probably thought:
   Social programs were giving too much money in aid to the poor
   There was a general lack of work ethic being caused by social welfare programs
   Helping the poor would make the economy worse than it already was at the time
   Poverty was linked to the economy so government should help the poor **
   Poverty was solved by a strong individual work ethic

3) If Charles Murray were allowed to reform welfare, TANF would probably:
   Have larger monthly cash benefits to help poor families raise their children
   Be eliminated***
   Be connected more closely to private sector job creation
   Be more comprehensive in its aid to the poor
   Be forced to make benefits meet the national need standard

4) Examined from an ideological perspective, which one does not belong with the others regarding the view of the poor?
   Elizabethan Poor Law – 1601 Grant in Aid Programs
   War on Poverty Puritan Work Ethic **
   Speenhamland Act

		REALITY	
		Null is true	Null is false
DECISION	Reject null	A.	C.
	Accept null	B.	D.

5) Knowing what we do today, which block of the contingency table above contains the decision to give the drug thalidomide to pregnant mothers in the 1950s?
   A
   B
   C
   D**
   None of the above

Synthesis

Synthesis may be thought of as creativity because it involves the production of things that are new or unique. In social work education that can involve production of professional documents, intervention plans, communications, and the display of skills in unique combinations. The creative demonstration of learning and skills lends itself more to the essay format. Another way to assess if students can perform a skill or complete a task is with performance assessment where students actually perform a skill or complete a task (e.g., conduct a research study or client interview).

Item one in figure six requires students to write an essay about proposing a new or improved way to handle American poverty. Students also identify weaknesses in their suggestions and view their work from a specific ideological position. Item two requires students to perform a client interview, a process recording and a psychosocial assessment to demonstrate communication and writing skills. Item three requires students to write and critique a research proposal. Any project or written assignment involves synthesis if it requires students to demonstrate social work skills. If we want to determine if our students can perform a skill, the best test may be to have them perform that skill.

Figure 6. Synthesis Level Test Items

1) Multi-part Essay Question: Social Policy

- Create a new way or improve how we currently deal with poverty in America. Your suggestions must include a RATIONALE.
- If your suggestions have been tried before in history (and they probably have in some form) how will you overcome the problems they encountered?
-
- What are the problems with your suggestions and what could you do to overcome these problems?
-
- Suggest an alternative policy that would be more progressive than what you just proposed and identify reasons why someone would support it.

2) Written Project: Social Work Practice Methods

- Produce an audiotape and process recording of a client interview you conduct with a classmate who portrays a client from your field placement.
- Write a psychosocial assessment of the client you interviewed. Supplement material you did not have time for in the interview.
- Create an intervention plan based on the psychosocial assessment you did from your client interview.

3) Written Project: Research Methods

- Write a research proposal that includes all six steps of the research process.
- Provide a justification for the steps in your proposal. For example, the cadence of your writing should be:
  "We chose a qualitative design because..."
  "We did choose sampling technique of X, BECAUSE it allowed us to...."
- Grading of the research proposal has three criterion: (1) completeness, (2) if the study makes sense, (3) how well you justified and explained what you did.

Evaluation

Evaluation requires students to make judgments based on external criteria or internal evidence. We must give students the external criteria and demonstrate how to utilize it to render judgments. Evaluative criteria exists for judging the soundness of research projects and hypothesis, judging the correctness of communication and responding skills, judging the correctness of ethical decisions, etc. The social work code of ethics also lends itself to the evaluation knowledge level. Evaluation with internal evidence involves students using personal perspectives or value systems to evaluate situations. Students often demonstrate evaluation with written projects or class discussion since judgements from internal evidence are neither "right nor wrong."

In figure seven, item one requires students to judge which choice meets the criteria for the best (most behaviorally specific) operational definition. As with all the levels, students must recall all relevant definitions and evaluative criteria to answer the question. Item two is similar but students recognize "why" a definition is not operationalized. Item three has students evaluate the weakness with the sampling method employed in a research study. Item four requires students to use criteria for conducting ethical studies to evaluate why a research proposal was rejected (Williams, Unrau & Grinnell, 1998). Item five requires students to determine what will occur to the poverty line if the measure of poverty is changed. Item six has students determine what research design a study employs, while item seven requires students to make a judgement about when to share confidential information.

Figure 7. Evaluation Level Test Items

1) Which of the following is the best operational definition?
   Caring and loving behavior — Hitting behavior
   Homosexual behavior — Slapping behavior **
   Violent behavior

2) Why is "showing love" a nominal definition?
   Behaviors are clearly specified — No linguistic errors are present
   Thoughts and actions are clearly specified — Specific behaviors are not clarified**
   There is no definition for love

3) Turn to the study on page 184 in your textbook. The main **SAMPLING** problem in this study was that the sample:
   Self selected ** — Did not match the population
   Was too large — Was too small and too homogeneous
   Was too diverse

4) What criteria did the agency most probably use to reject this research study?
   "A social work agency rejects a proposed study because clients in crisis are assigned to a control group and will receive no service.
   Researchable — Researcher interest area
   Relevant — Ethical **
   Feasible

5) If we adopted the relative poverty measure in the USA, what would happen to the poverty count and line?
   Count-decrease; line-same — Line-same; count-same
   Count-increase; line-increase ** — Line-increase; count-decrease
   Line-same; count-increase

6) Turn to the study on page 127 in your textbook. What is the design of this study?

A) O X O **
   O O

B) X OO
   OO

C) X1 O
   X2 O

D) O X O

E) OO X OO

7) You may share information without a clients written permission **EXCEPT** when the client:
   Has been physically abusing his child — Has been verbally abusing his child **
   Is HIV+, and not practicing safe sex — None of the above
   Has threatened suicide and has a lethal plan

By now, some of you may be thinking that testing for critical thinking involves advance preparation. Well, it does. It is almost impossible to achieve anything near to critical thinking if we write our exams the night before needed while trying to recall what was taught. There are too many factors that go into writing good test questions for them to be written in haste. Figure eight includes some helpful guidelines to consider when writing your test questions. Even if we write our test questions with care, test questions do not always perform up to standards or do what we intended them to do. My students are usually willing to share what they thought were problems with disputed questions, even if the problem was that they simply answered the question incorrectly (sometimes their only criteria for evaluating a test question). Figure nine includes some major considerations for testing our test questions.

Creating tests using Bloom's taxonomy takes time and intention but the effort is well worth it. The taxonomy has helped me clarify my intentions in teaching and testing and in creating course materials that match my learning expectations for students. I can also make my tests more challenging by teaching and testing to higher knowledge levels instead of by burying essential information within other information not intended for testing, or by making finer discriminations between response choices. Students often say my course material is "tough but fair" (high praise from students). I encourage you to try utilizing Bloom's taxonomy to create your teaching and testing materials.

Figure 8. General Principles for Writing Test Questions

- Avoid long questions, they take more time to read and increase test time
- Shorten questions and answers as much as possible
- Do not make longest answer correct!
- Do not make **ALL OF THE ABOVE** answers always correct
- Rotate correct answer choices so students do not react to patterns
- Avoid questions in the negative, or mark clearly with **EXCEPT**
- True false questions should be either true or false, and become too easy when the false statements are too clearly false.
- May format questions to have a definition in the question and names as the answers, or the reverse.
- Have examples ready for application questions that are close to the concept but are not the same as those utilized in class.

Figure 9. General Principles for Testing Test Questions

- Evaluating norm referenced and criterion referenced test questions is different. Norm referenced testing compares student performance to other students (normal curve). Criterion referenced measurement compares student performance to a standard.
- The Item Difficulty Index shows how many students answered questions correctly. Too much error (over 70%) may indicate a problem with an item, too little error (less than 30%) may be acceptable depending on the goal of the testing.
- Ask students to explain how they answered the questions will show the instructor if a question tapped the intended knowledge level.
- Different errors require different types of correction. The errors may not be apparent until the student explains how they tried to answer the question.
- Content validity is critical for criterion referenced testing and is established by determining if content tested links to content covered.

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